

## Research Highlight

For more than two decades, radar wind profilers of the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Climate Research Facility have provided a unique data set valuable for studying a number of atmospheric conditions such as low-level horizontal winds. Now, work published in the **Journal of Atmospheric and Oceanic Technology** by an international team of researchers suggests that the instruments' use can be extended to better study how clouds transition to the precipitation that waters crops or causes flooding.

The ARM wind profilers take readings in five directions—south, north, east, west, and vertical. While this cycle is optimal for determining wind directions, the wind profilers are also capable of penetrating deep precipitating cloud systems. This fact gives them an advantage over other instruments typically used to study rainfall. For instance, some cloud radars are challenged to probe deep precipitation because liquid can interfere with the signal.

To fully exploit the potential of the wind profiler to gather data on rainfall, the research team reconfigured a wind profiler at the ARM Southern Great Plains research site in Oklahoma. In the revised configuration, the instrument spent more time sampling vertically and took quick, successive measurements that looked both near and far. Researchers ran the resulting data through a series of processing and calibration steps to screen out influences that could degrade the data.

To confirm that the screened data represented real-world conditions, the research team used the same process on data gathered during the spring 2011 Midlatitude Continental Convective Clouds Experiment conducted at the Southern Great Plains site. The experiment was a joint field campaign between ARM and NASA. In that experiment, scientists used a variety of instruments, including a dense network of rain gauges, radars, and wind profilers, to measure clouds and precipitation both at ground level and in the atmosphere.

In the current study, researchers found that the reconfigured wind profilers can supply complementary information from the atmospheric column about surface rainfall and the structure of the precipitation aloft. These results support the use of wind profiler observations as a centerpiece for future rainfall studies.

## Reference(s)

Tridon F, A Battaglia, P Kollias, E Luke, and C Williams. 2013. "Signal post-processing and reflectivity calibration of the Atmospheric Radiation Measurement Program 915 MHz wind profilers." *Journal of Atmospheric and Oceanic Technology*, 30(6), doi:10.1175/JTECH-D-12-00146.1.

## Contributors

Pavlos Kollias, *McGill University*

## Working Group(s)

Cloud Life Cycle



Because ARM's wind profilers (foreground) can take vertical as well as horizontal measurements, the instruments can be used with appropriate processing and calibration to help study rainfall.